FIG. 1

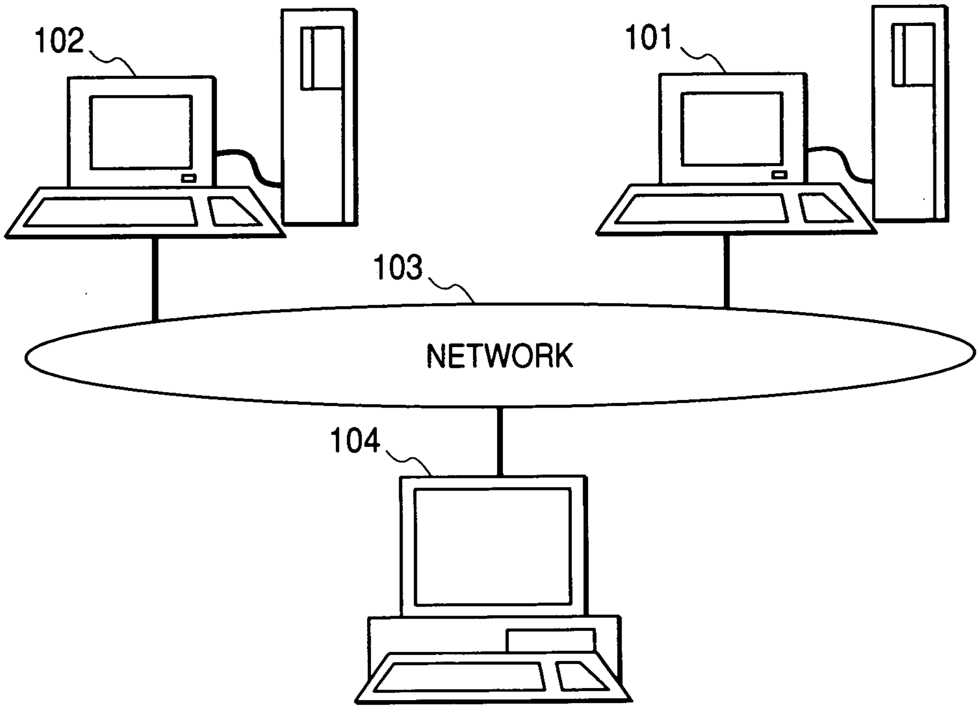


FIG. 2

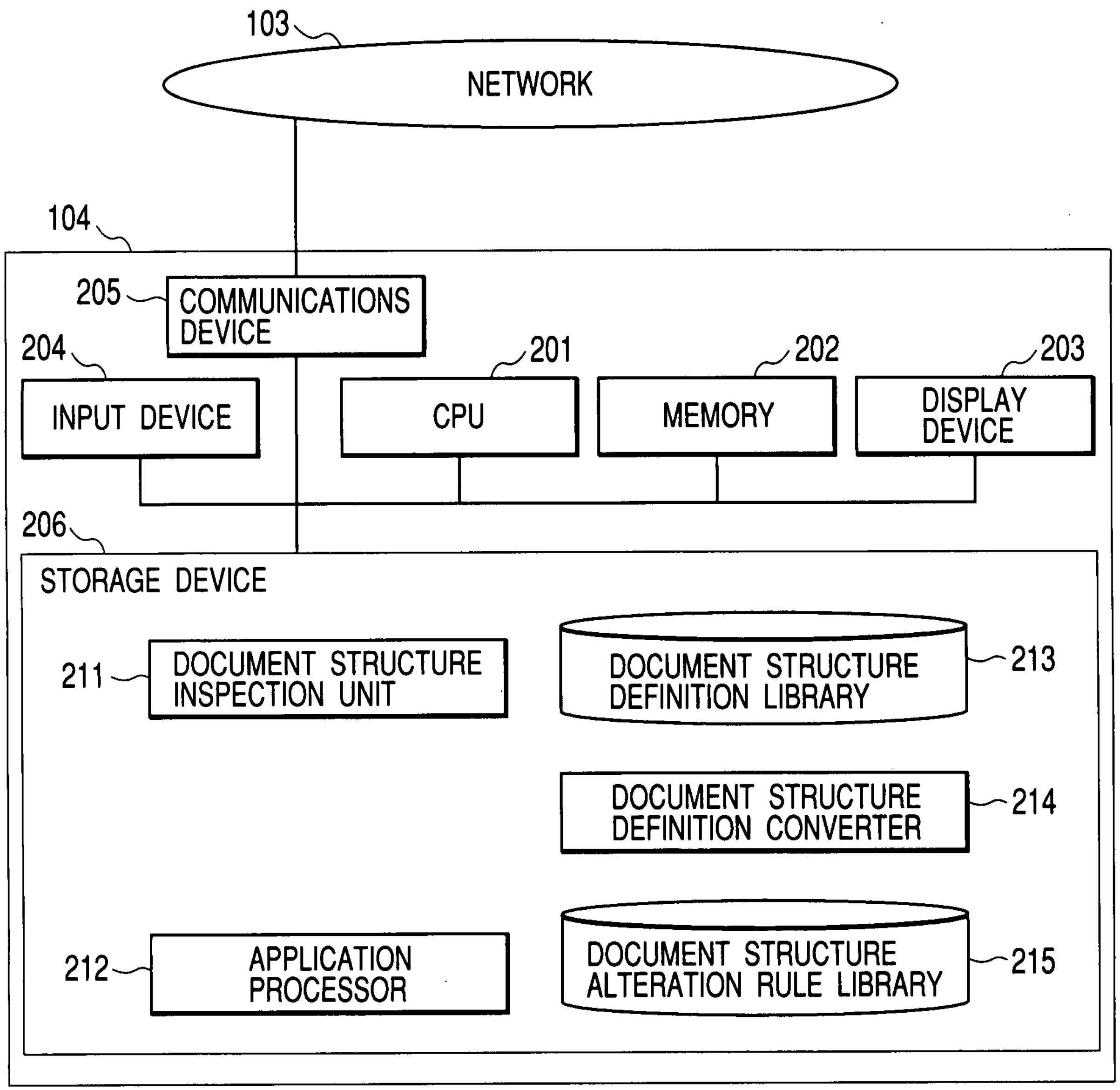
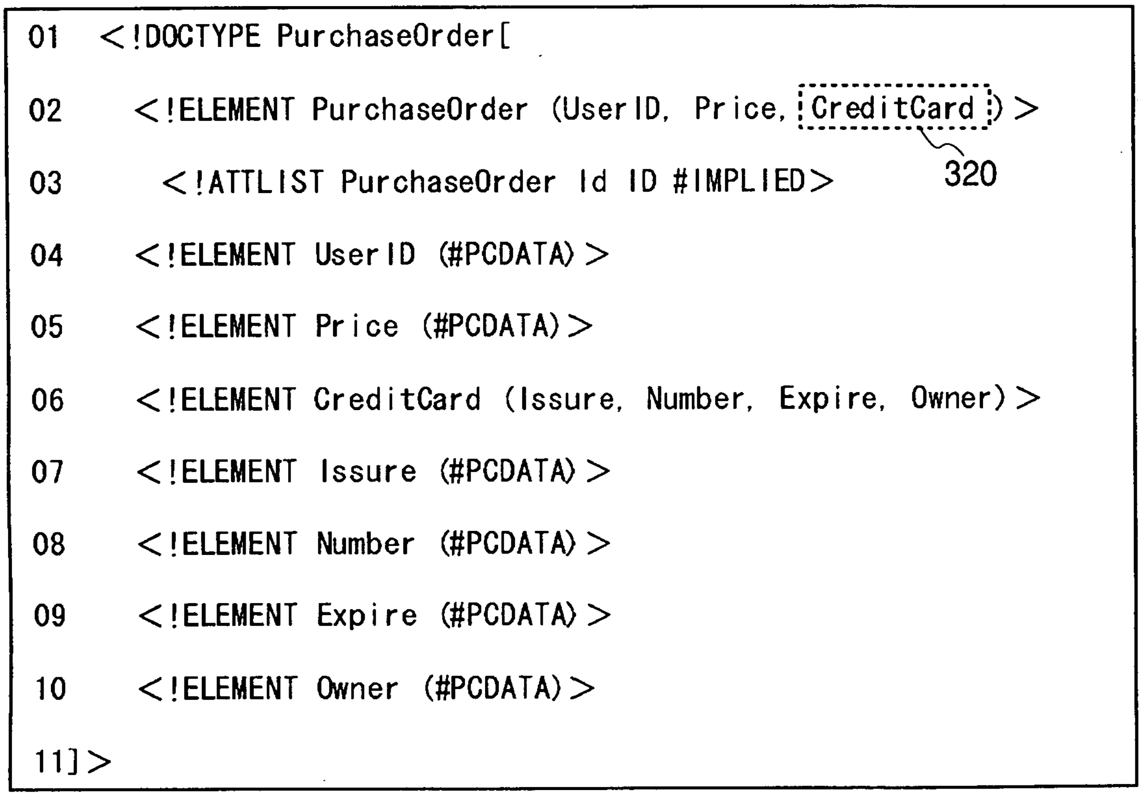
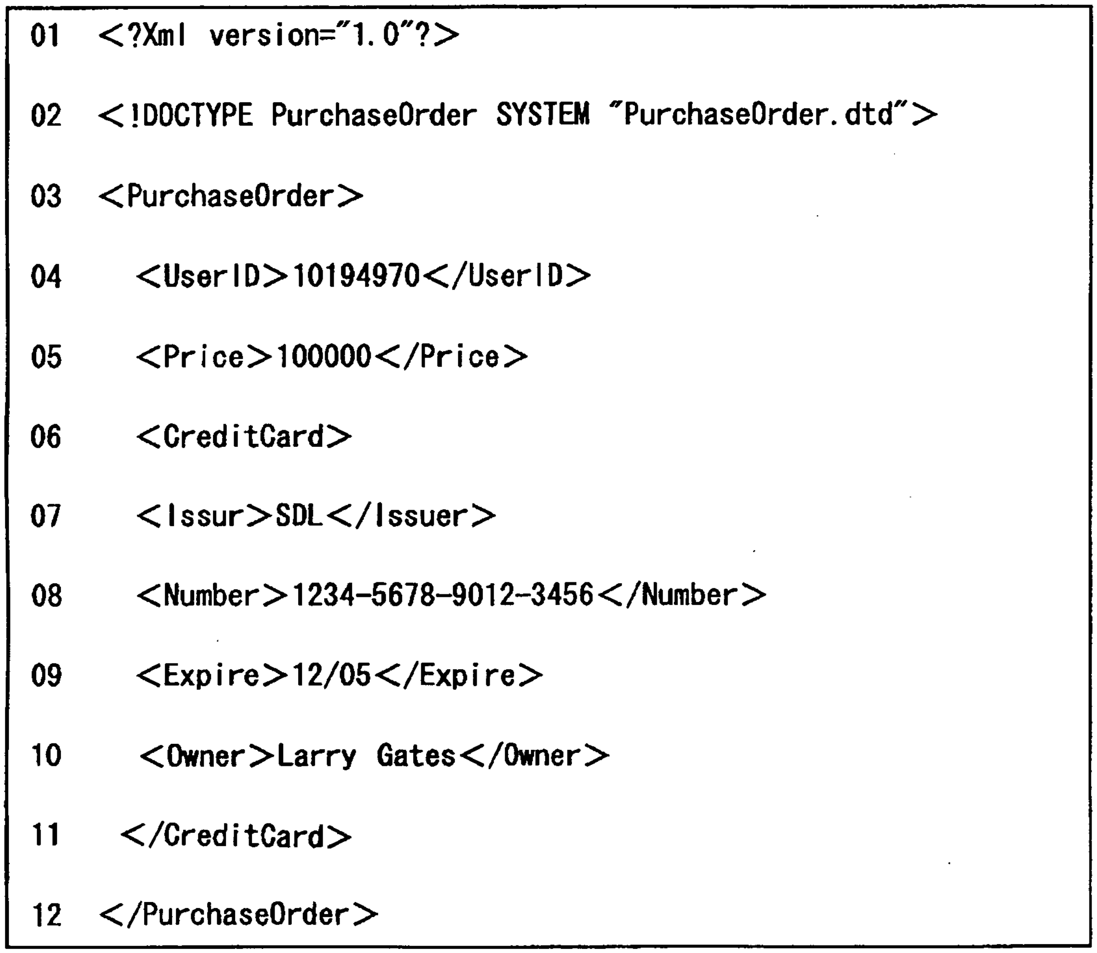

103
NETWORK
104
205
COMMUNICATIONS DEVICE
204
INPUT DEVICE
201
CPU
202
MEMORY
203
DISPLAY DEVICE
206
STORAGE DEVICE
211
DOCUMENT STRUCTURE INSPECTION UNIT
213
DOCUMENT STRUCTURE DEFINITION LIBRARY
214
DOCUMENT STRUCTURE DEFINITION CONVERTER
212
APPLICATION PROCESSOR
215
DOCUMENT STRUCTURE ALTERATION RULE LIBRARY

FIG. 3



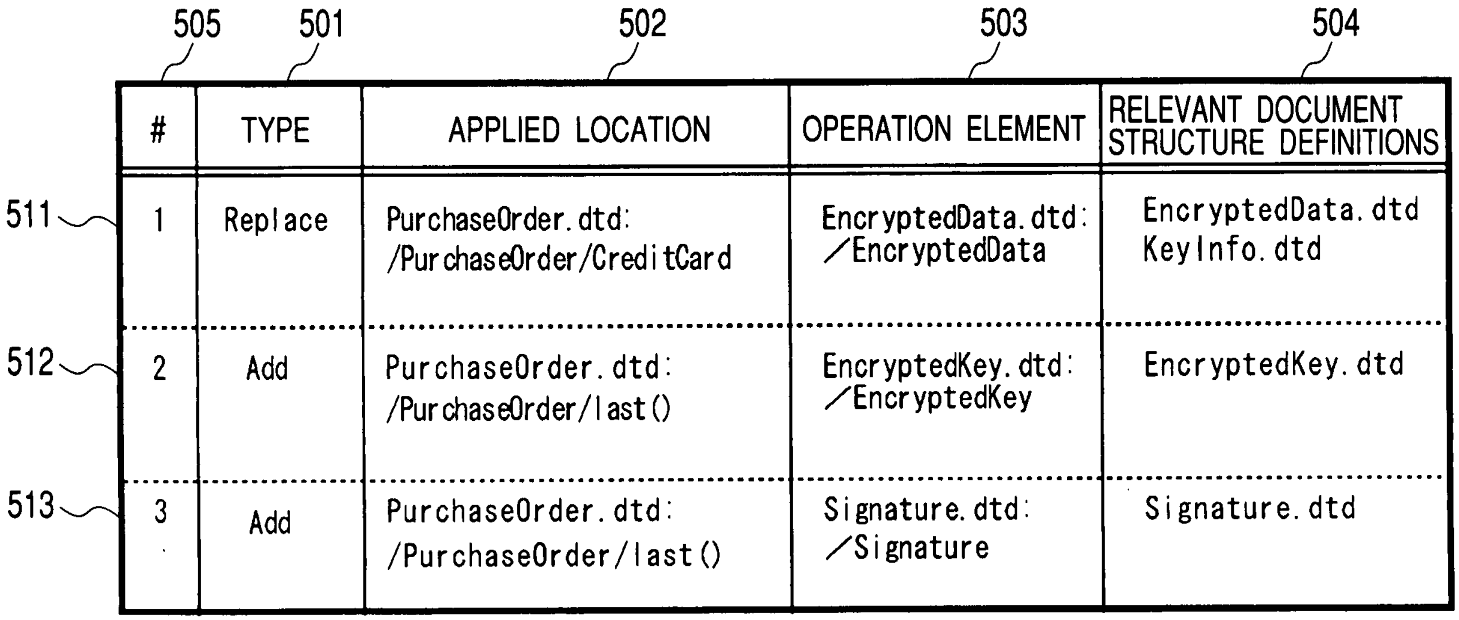
```
<!DOCTYPE PurchaseOrder[
  <!ELEMENT PurchaseOrder (UserID, Price, CreditCard )>
    <!ATTLIST PurchaseOrder Id ID #IMPLIED>
  <!ELEMENT UserID (#PCDATA)>
  <!ELEMENT Price (#PCDATA)>
  <!ELEMENT CreditCard (Issure, Number, Expire, Owner)>
  <!ELEMENT Issure (#PCDATA)>
  <!ELEMENT Number (#PCDATA)>
  <!ELEMENT Expire (#PCDATA)>
  <!ELEMENT Owner (#PCDATA)>
]>
```

FIG. 4



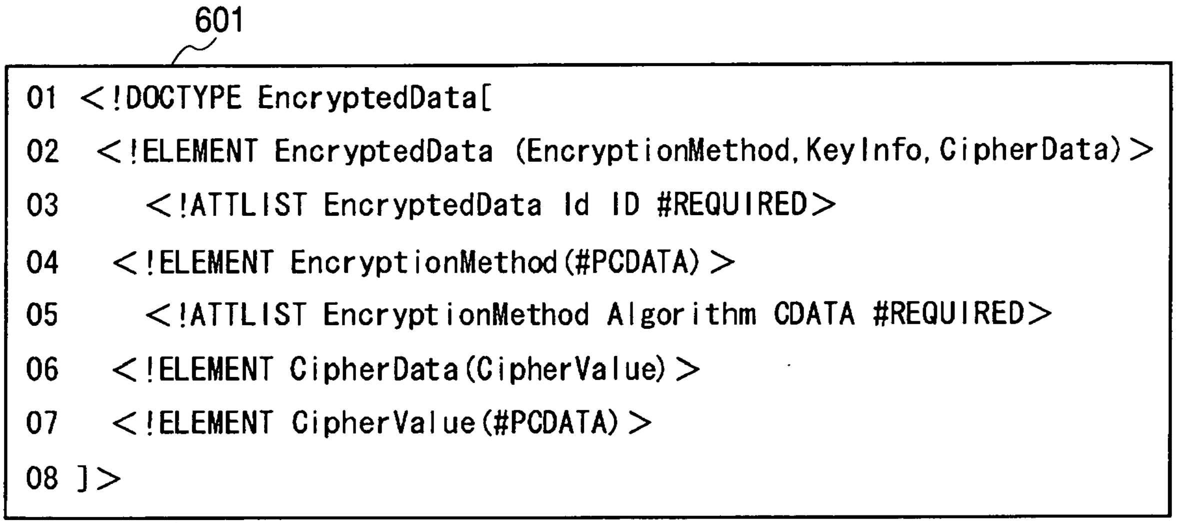
```
<?Xml version="1.0"?>
<!DOCTYPE PurchaseOrder SYSTEM "PurchaseOrder.dtd">
<PurchaseOrder>
   <UserID>10194970</UserID>
   <Price>100000</Price>
   <CreditCard>
   <Issur>SDL</Issuer>
   <Number>1234-5678-9012-3456</Number>
   <Expire>12/05</Expire>
   <Owner>Larry Gates</Owner>
  </CreditCard>
</PurchaseOrder>
```

FIG. 5


505
501
502
503
504
511
512
513

#	TYPE	APPLIED LOCATION	OPERATION ELEMENT	RELEVANT DOCUMENT STRUCTURE DEFINITIONS
1	Replace	PurchaseOrder.dtd: /PurchaseOrder/CreditCard	EncryptedData.dtd: /EncryptedData	EncryptedData.dtd KeyInfo.dtd
2	Add	PurchaseOrder.dtd: /PurchaseOrder/last()	EncryptedKey.dtd: /EncryptedKey	EncryptedKey.dtd
3	Add	PurchaseOrder.dtd: /PurchaseOrder/last()	Signature.dtd: /Signature	Signature.dtd

FIG. 6



```
<!DOCTYPE EncryptedData[
 <!ELEMENT EncryptedData (EncryptionMethod,KeyInfo,CipherData)>
    <!ATTLIST EncryptedData Id ID #REQUIRED>
  <!ELEMENT EncryptionMethod(#PCDATA)>
    <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT CipherData(CipherValue)>
  <!ELEMENT CipherValue(#PCDATA)>
]>
```

FIG. 7

```
<!DOCTYPE EncryptedKey [
  <!ELEMENT EncryptedKey(EncryptionMethod,KeyInfo,CipherData,ReferenceList>
    <!ATTLIST EncryptedKey Id ID #REQUIRED>
  <!ELEMENT ReferenceList(DataReference | Key Reference)+>
  <!ELEMENT DataReference(#PCDATA)>
    <!ATTLIST DataReference URI CDATA #REQUIRED>
  <!ELEMENT KeyReference(#PCDATA)>
    <!ATTLIST KeyReference URI CDATA #REQUIRED>
]>
```

FIG. 8

```
<!DOCTYPE Signature [
  <!ELEMENT  Signature(SignedInfo,SignatureValue,KeyInfo?)>
  <!ELEMENT  SignedInfo(CanonicalizationMethod,SignatureMetod,Reference+)>
  <!ELEMENT  CanonicalizationMethod(#PCDATA)>
    <!ATTLIST CanonicalizationMetod Algorithm CDATA #REQUIRED>
  <!ELEMENT SignatureMethod(#PCDATA)>
    <!ATTLIST SignatureMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT  Reference(DigestMethod,DigestValue)>
    <!ATTLIST Reference URI CDATA #REQUIRED>
  <!ELEMENT  DigestMethod(#PCDATA)>
    <!ATTLIST DigestMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT  DigestValue(#PCDATA)>
  <!ELEMENT  SignatureValue(#PCDATA)>
]>
```

FIG. 9

```
<!DOCTYPE KeyInfo[
  <!ELEMENT KeyInfo(RetrievalMethod | KeyName)>
  <!ELEMENT RetrievalMethod(#PCDATA)>
    <!ATTLIST RetrievalMethod
            Type          CDATA        #REQUIRED
            URI           CDATA        #REQUIRED>
  <!ELEMENT KeyName(#PCDATA)>
]>
```

FIG. 10

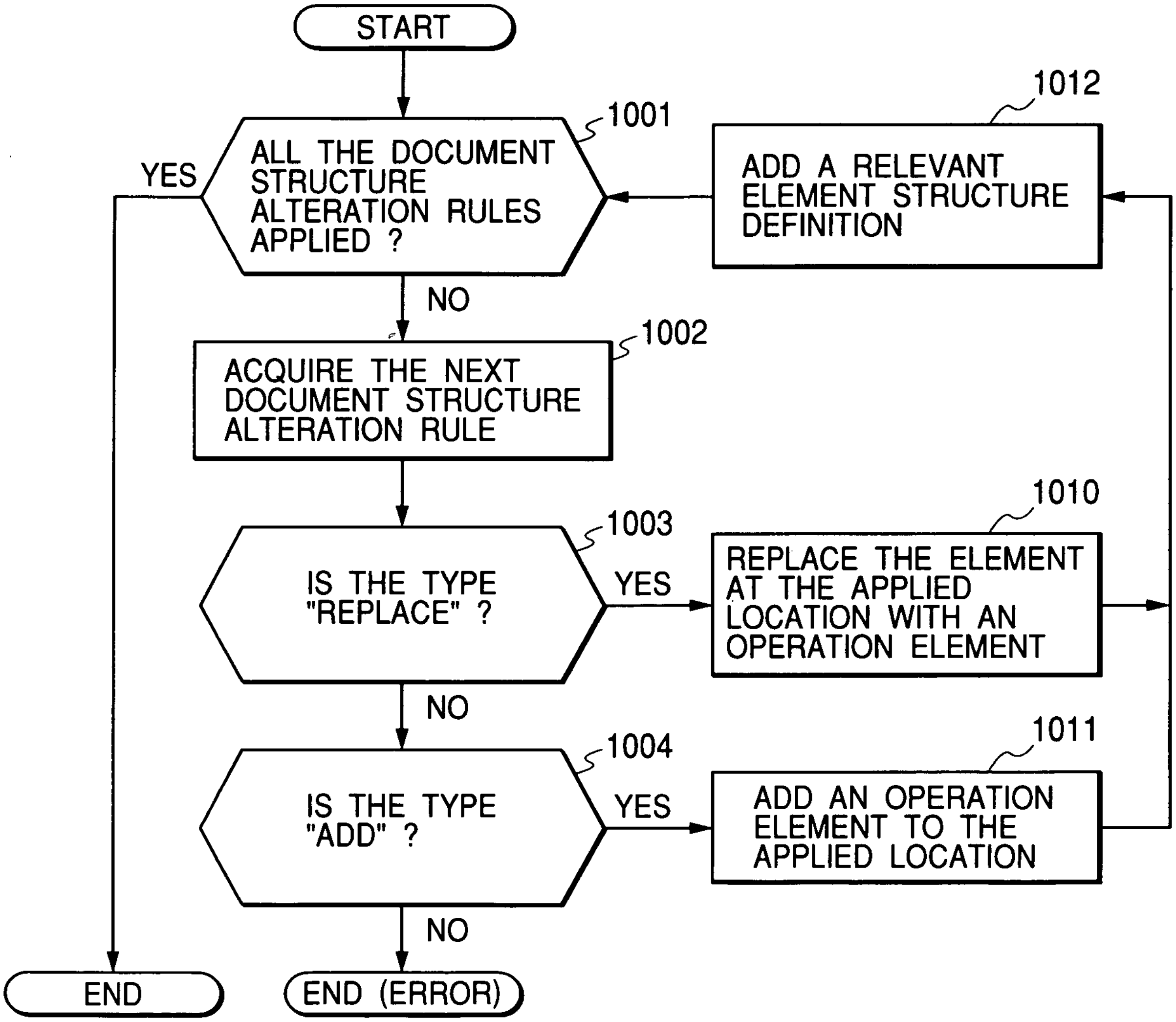
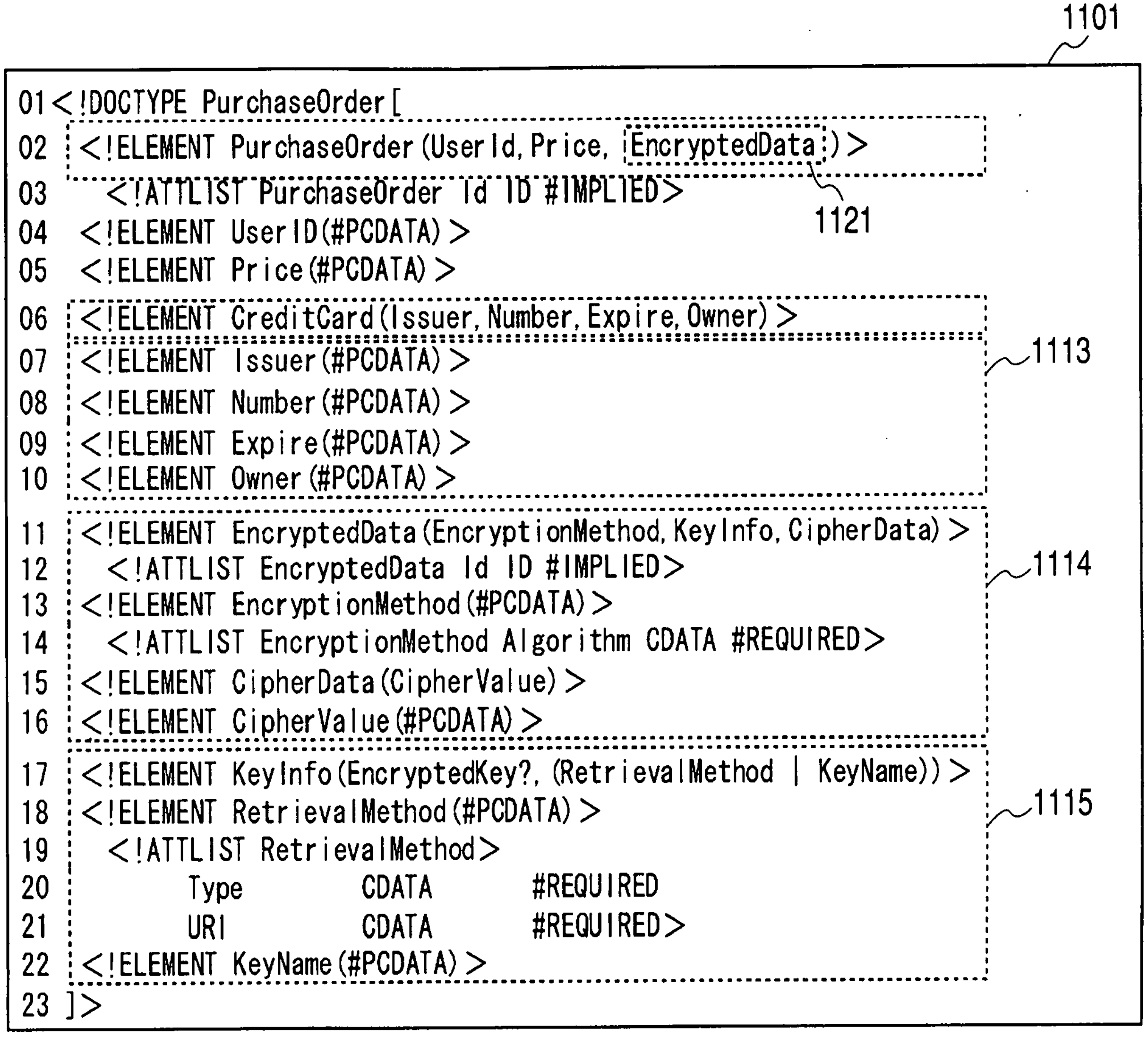
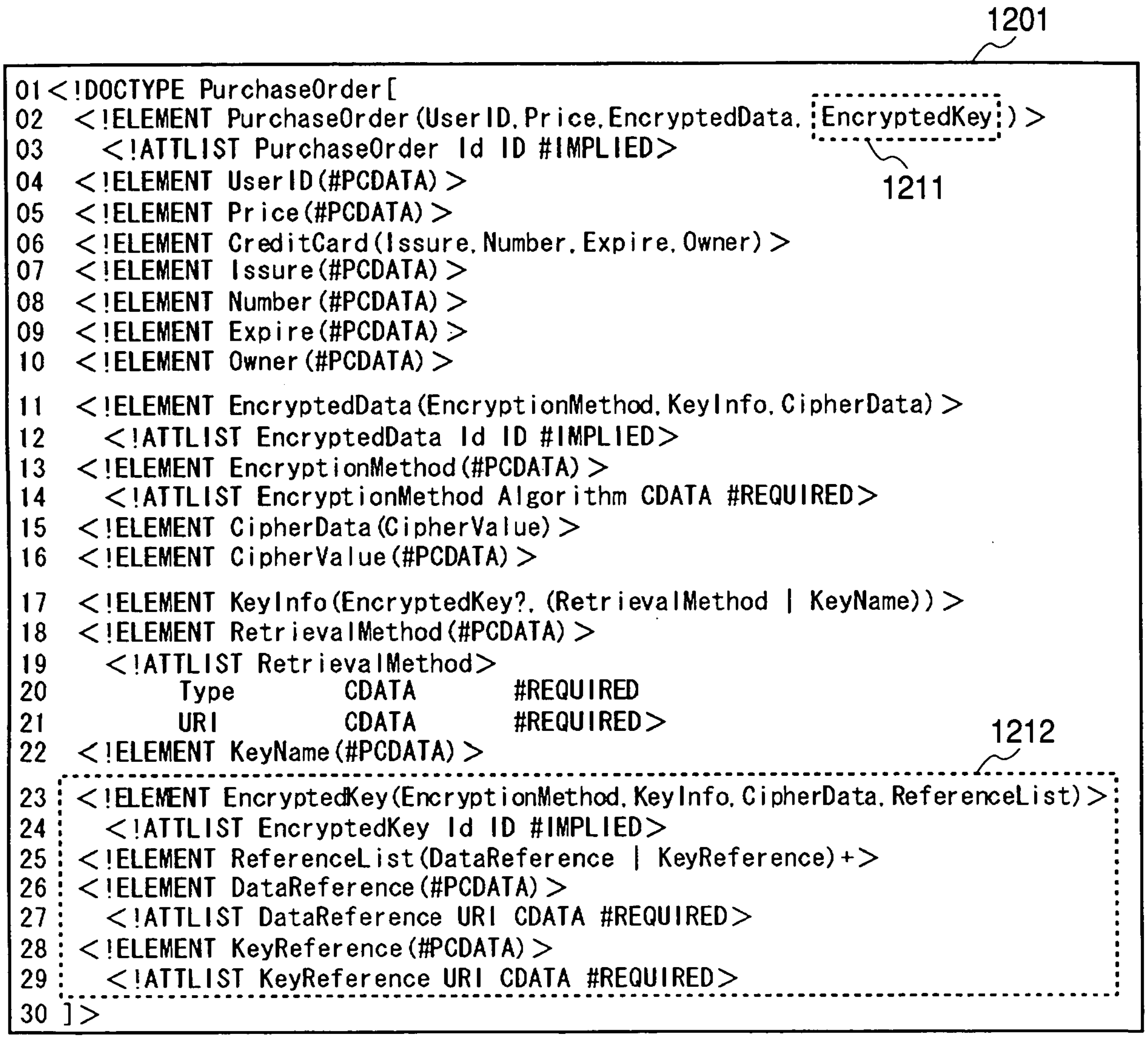

START
ALL THE DOCUMENT STRUCTURE ALTERATION RULES APPLIED ?
1001
YES
NO
ACQUIRE THE NEXT DOCUMENT STRUCTURE ALTERATION RULE
1002
IS THE TYPE "REPLACE" ?
1003
YES
NO
IS THE TYPE "ADD" ?
1004
YES
NO
END
END (ERROR)
ADD A RELEVANT ELEMENT STRUCTURE DEFINITION
1012
REPLACE THE ELEMENT AT THE APPLIED LOCATION WITH AN OPERATION ELEMENT
1010
ADD AN OPERATION ELEMENT TO THE APPLIED LOCATION
1011

FIG. 11



```
<!DOCTYPE PurchaseOrder[
<!ELEMENT PurchaseOrder(UserId,Price, EncryptedData)>
  <!ATTLIST PurchaseOrder Id ID #IMPLIED>
<!ELEMENT UserID(#PCDATA)>
<!ELEMENT Price(#PCDATA)>
<!ELEMENT CreditCard(Issuer,Number,Expire,Owner)>
<!ELEMENT Issuer(#PCDATA)>
<!ELEMENT Number(#PCDATA)>
<!ELEMENT Expire(#PCDATA)>
<!ELEMENT Owner(#PCDATA)>
<!ELEMENT EncryptedData(EncryptionMethod,KeyInfo,CipherData)>
  <!ATTLIST EncryptedData Id ID #IMPLIED>
<!ELEMENT EncryptionMethod(#PCDATA)>
  <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
<!ELEMENT CipherData(CipherValue)>
<!ELEMENT CipherValue(#PCDATA)>
<!ELEMENT KeyInfo(EncryptedKey?,(RetrievalMethod | KeyName))>
<!ELEMENT RetrievalMethod(#PCDATA)>
  <!ATTLIST RetrievalMethod>
        Type       CDATA     #REQUIRED
        URI        CDATA     #REQUIRED>
<!ELEMENT KeyName(#PCDATA)>
]>
```

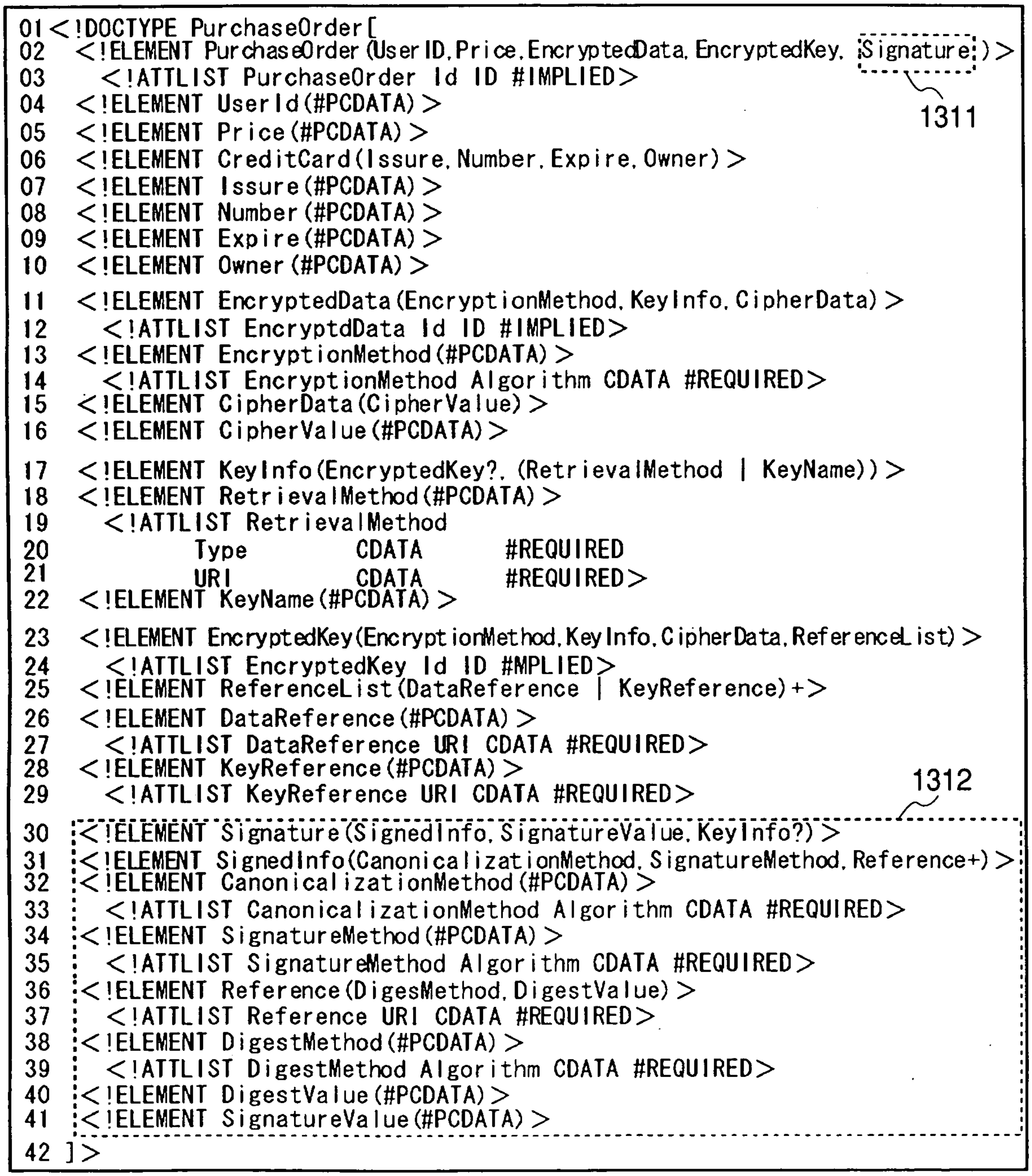
FIG. 12



```
<!DOCTYPE PurchaseOrder[
  <!ELEMENT PurchaseOrder(UserID,Price,EncryptedData, EncryptedKey )>
    <!ATTLIST PurchaseOrder Id ID #IMPLIED>
  <!ELEMENT UserID(#PCDATA)>
  <!ELEMENT Price(#PCDATA)>
  <!ELEMENT CreditCard(Issure,Number,Expire,Owner)>
  <!ELEMENT Issure(#PCDATA)>
  <!ELEMENT Number(#PCDATA)>
  <!ELEMENT Expire(#PCDATA)>
  <!ELEMENT Owner(#PCDATA)>
  <!ELEMENT EncryptedData(EncryptionMethod,KeyInfo,CipherData)>
    <!ATTLIST EncryptedData Id ID #IMPLIED>
  <!ELEMENT EncryptionMethod(#PCDATA)>
    <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT CipherData(CipherValue)>
  <!ELEMENT CipherValue(#PCDATA)>
  <!ELEMENT KeyInfo(EncryptedKey?, (RetrievalMethod | KeyName))>
  <!ELEMENT RetrievalMethod(#PCDATA)>
    <!ATTLIST RetrievalMethod>
         Type       CDATA      #REQUIRED
         URI        CDATA      #REQUIRED>
  <!ELEMENT KeyName(#PCDATA)>
  <!ELEMENT EncryptedKey(EncryptionMethod,KeyInfo,CipherData,ReferenceList)>
    <!ATTLIST EncryptedKey Id ID #IMPLIED>
  <!ELEMENT ReferenceList(DataReference | KeyReference)+>
  <!ELEMENT DataReference(#PCDATA)>
    <!ATTLIST DataReference URI CDATA #REQUIRED>
  <!ELEMENT KeyReference(#PCDATA)>
    <!ATTLIST KeyReference URI CDATA #REQUIRED>
]>
```

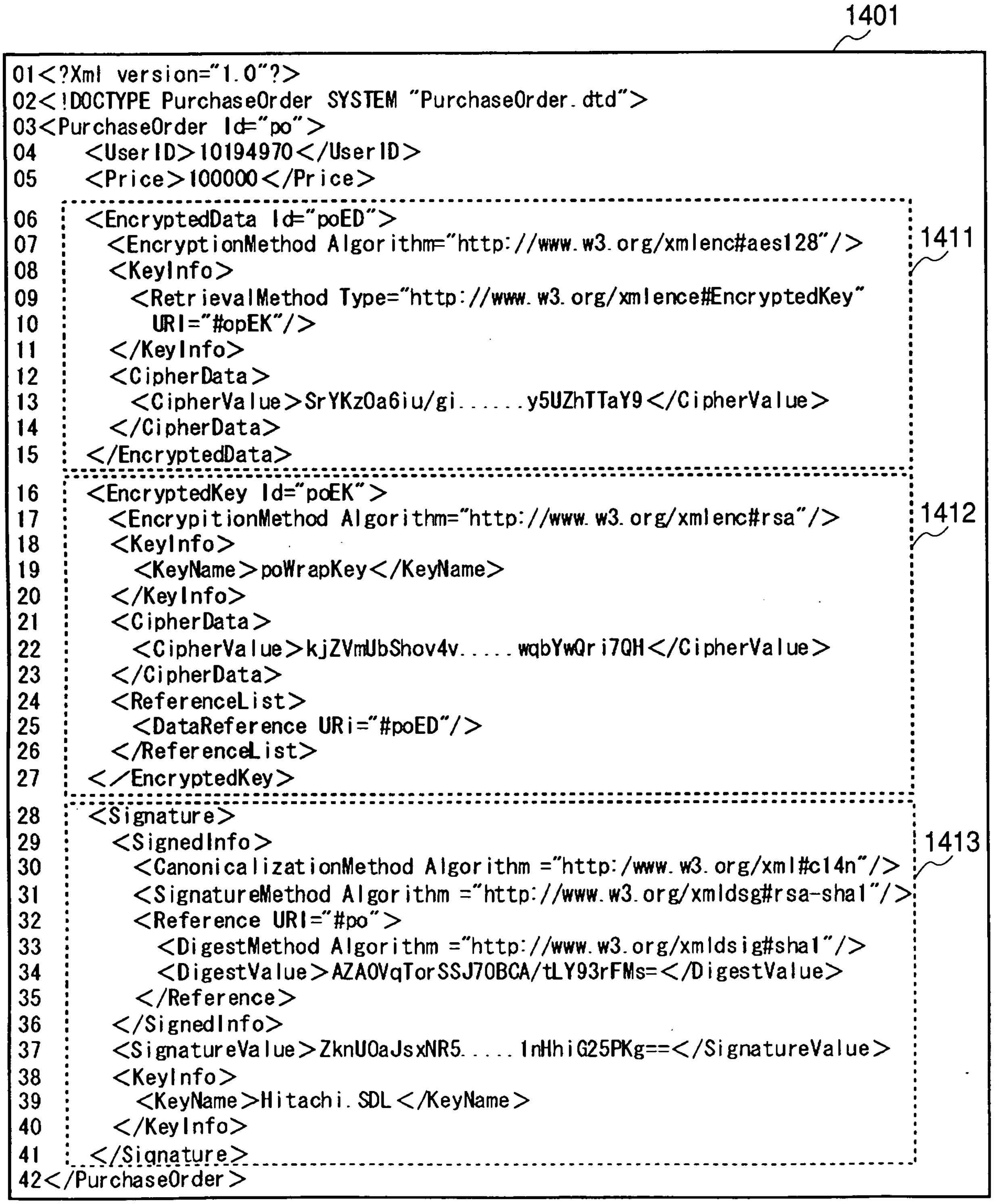
1201
1211
1212

FIG. 13



```
<!DOCTYPE PurchaseOrder[
  <!ELEMENT PurchaseOrder(UserID,Price,EncryptedData,EncryptedKey,Signature)>
    <!ATTLIST PurchaseOrder Id ID #IMPLIED>
  <!ELEMENT UserId(#PCDATA)>
  <!ELEMENT Price(#PCDATA)>
  <!ELEMENT CreditCard(Issure,Number,Expire,Owner)>
  <!ELEMENT Issure(#PCDATA)>
  <!ELEMENT Number(#PCDATA)>
  <!ELEMENT Expire(#PCDATA)>
  <!ELEMENT Owner(#PCDATA)>
  <!ELEMENT EncryptedData(EncryptionMethod,KeyInfo,CipherData)>
    <!ATTLIST EncryptdData Id ID #IMPLIED>
  <!ELEMENT EncryptionMethod(#PCDATA)>
    <!ATTLIST EncryptionMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT CipherData(CipherValue)>
  <!ELEMENT CipherValue(#PCDATA)>
  <!ELEMENT KeyInfo(EncryptedKey?,(RetrievalMethod | KeyName))>
  <!ELEMENT RetrievalMethod(#PCDATA)>
    <!ATTLIST RetrievalMethod
          Type        CDATA       #REQUIRED
          URI         CDATA       #REQUIRED>
  <!ELEMENT KeyName(#PCDATA)>
  <!ELEMENT EncryptedKey(EncryptionMethod,KeyInfo,CipherData,ReferenceList)>
    <!ATTLIST EncryptedKey Id ID #MPLIED>
  <!ELEMENT ReferenceList(DataReference | KeyReference)+>
  <!ELEMENT DataReference(#PCDATA)>
    <!ATTLIST DataReference URI CDATA #REQUIRED>
  <!ELEMENT KeyReference(#PCDATA)>
    <!ATTLIST KeyReference URI CDATA #REQUIRED>
  <!ELEMENT Signature(SignedInfo,SignatureValue,KeyInfo?)>
  <!ELEMENT SignedInfo(CanonicalizationMethod,SignatureMethod,Reference+)>
  <!ELEMENT CanonicalizationMethod(#PCDATA)>
    <!ATTLIST CanonicalizationMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT SignatureMethod(#PCDATA)>
    <!ATTLIST SignatureMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT Reference(DigesMethod,DigestValue)>
    <!ATTLIST Reference URI CDATA #REQUIRED>
  <!ELEMENT DigestMethod(#PCDATA)>
    <!ATTLIST DigestMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT DigestValue(#PCDATA)>
  <!ELEMENT SignatureValue(#PCDATA)>
]>
```

FIG. 14


1401
1411
1412
1413

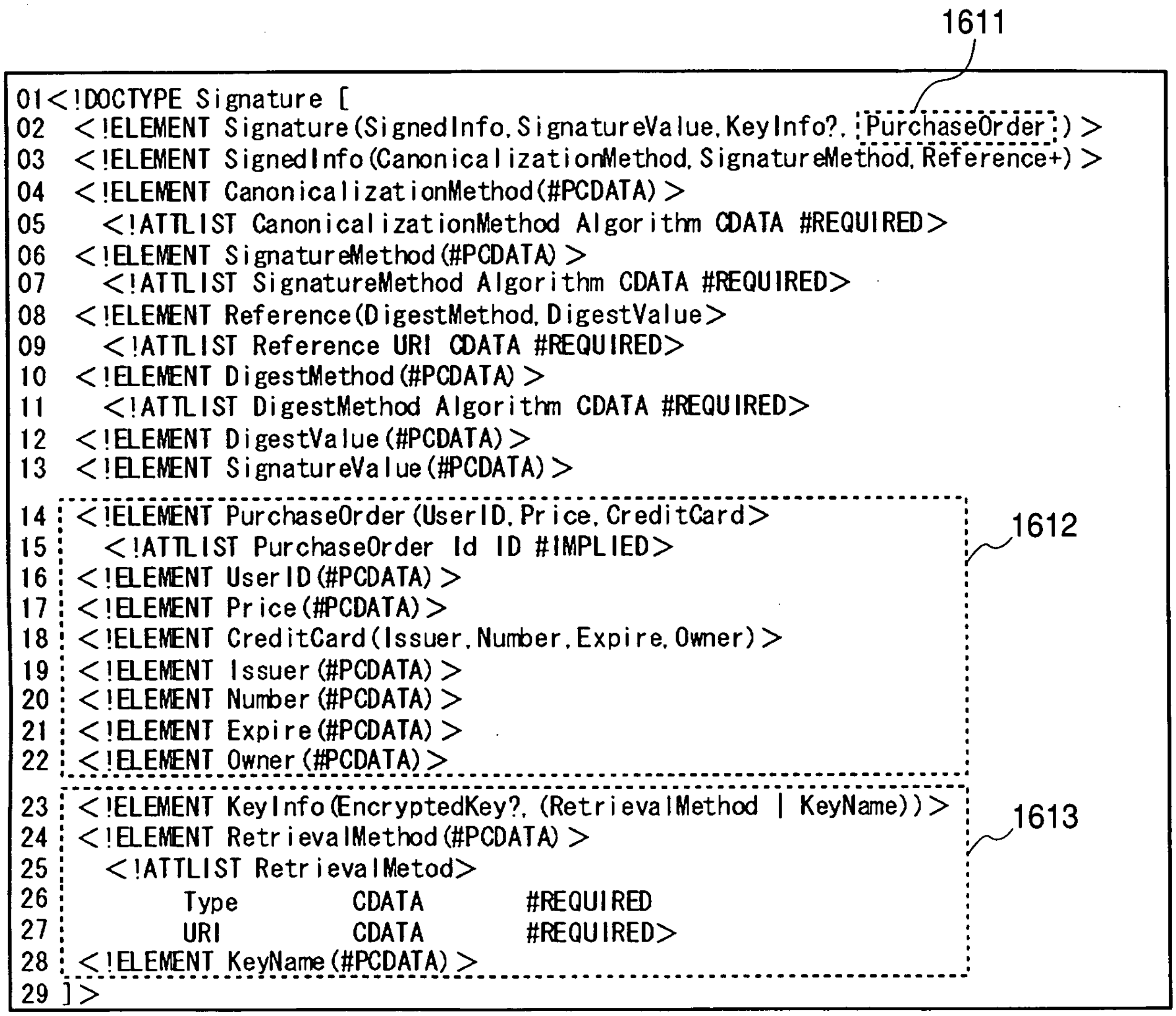
```
<?Xml version="1.0"?>
<!DOCTYPE PurchaseOrder SYSTEM "PurchaseOrder.dtd">
<PurchaseOrder Id="po">
  <UserID>10194970</UserID>
  <Price>100000</Price>
  <EncryptedData Id="poED">
    <EncryptionMethod Algorithm="http://www.w3.org/xmlenc#aes128"/>
    <KeyInfo>
      <RetrievalMethod Type="http://www.w3.org/xmlence#EncryptedKey"
        URI="#opEK"/>
    </KeyInfo>
    <CipherData>
      <CipherValue>SrYKzOa6iu/gi......y5UZhTTaY9</CipherValue>
    </CipherData>
  </EncryptedData>
  <EncryptedKey Id="poEK">
    <EncrypitionMethod Algorithm="http://www.w3.org/xmlenc#rsa"/>
    <KeyInfo>
      <KeyName>poWrapKey</KeyName>
    </KeyInfo>
    <CipherData>
      <CipherValue>kjZVmUbShov4v.....wqbYwQri7QH</CipherValue>
    </CipherData>
    <ReferenceList>
      <DataReference URi="#poED"/>
    </ReferenceList>
  </EncryptedKey>
  <Signature>
    <SignedInfo>
      <CanonicalizationMethod Algorithm ="http:/www.w3.org/xml#c14n"/>
      <SignatureMethod Algorithm ="http://www.w3.org/xmldsg#rsa-sha1"/>
      <Reference URI="#po">
        <DigestMethod Algorithm ="http://www.w3.org/xmldsig#sha1"/>
        <DigestValue>AZAOVqTorSSJ70BCA/tLY93rFMs=</DigestValue>
      </Reference>
    </SignedInfo>
    <SignatureValue>ZknUOaJsxNR5.....1nHhiG25PKg==</SignatureValue>
    <KeyInfo>
      <KeyName>Hitachi.SDL</KeyName>
    </KeyInfo>
  </Signature>
</PurchaseOrder>
```

FIG. 15

1511

#	TYPE	APPLIED LOCATION	OPERATION ELEMENT	RELEVANT DOCUMENT STRUCTURE DEFINITIONS
4	Add	Signature.dtd: /Signature/last()	PurchaseOrder.dtd: /PurchaseOrder	PurchaseOrder.dtd KeyInfo.dtd

FIG. 16


1611
1612
1613

```
<!DOCTYPE Signature [
  <!ELEMENT Signature(SignedInfo,SignatureValue,KeyInfo?,PurchaseOrder)>
  <!ELEMENT SignedInfo(CanonicalizationMethod,SignatureMethod,Reference+)>
  <!ELEMENT CanonicalizationMethod(#PCDATA)>
    <!ATTLIST CanonicalizationMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT SignatureMethod(#PCDATA)>
    <!ATTLIST SignatureMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT Reference(DigestMethod,DigestValue>
    <!ATTLIST Reference URI CDATA #REQUIRED>
  <!ELEMENT DigestMethod(#PCDATA)>
    <!ATTLIST DigestMethod Algorithm CDATA #REQUIRED>
  <!ELEMENT DigestValue(#PCDATA)>
  <!ELEMENT SignatureValue(#PCDATA)>
  <!ELEMENT PurchaseOrder(UserID,Price,CreditCard>
    <!ATTLIST PurchaseOrder Id ID #IMPLIED>
  <!ELEMENT UserID(#PCDATA)>
  <!ELEMENT Price(#PCDATA)>
  <!ELEMENT CreditCard(Issuer,Number,Expire,Owner)>
  <!ELEMENT Issuer(#PCDATA)>
  <!ELEMENT Number(#PCDATA)>
  <!ELEMENT Expire(#PCDATA)>
  <!ELEMENT Owner(#PCDATA)>
  <!ELEMENT KeyInfo(EncryptedKey?,(RetrievalMethod | KeyName))>
  <!ELEMENT RetrievalMethod(#PCDATA)>
    <!ATTLIST RetrievalMetod>
        Type      CDATA      #REQUIRED
        URI       CDATA      #REQUIRED>
  <!ELEMENT KeyName(#PCDATA)>
]>
```

FIG. 17

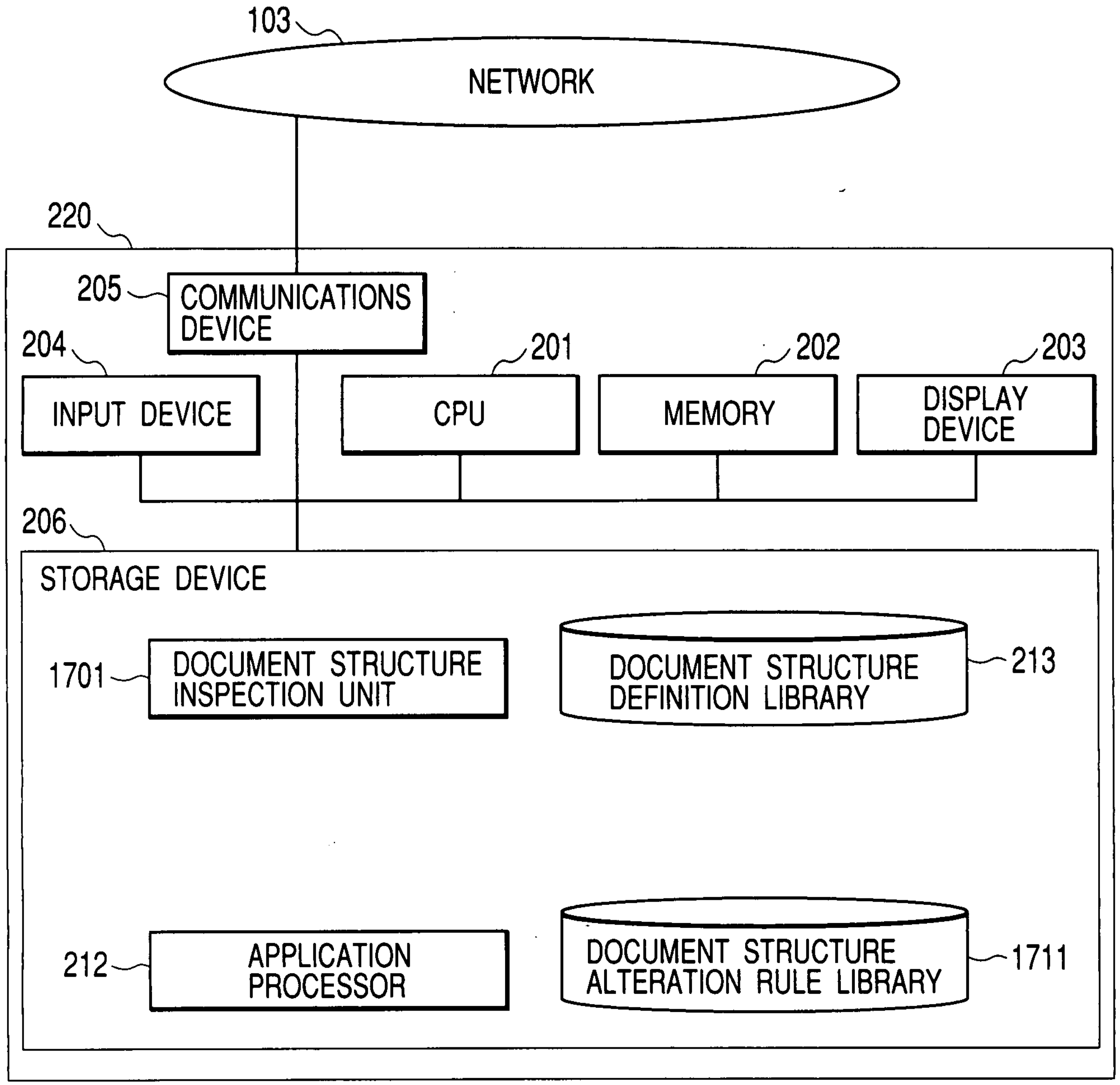

103
NETWORK
220
205
COMMUNICATIONS DEVICE
204
INPUT DEVICE
201
CPU
202
MEMORY
203
DISPLAY DEVICE
206
STORAGE DEVICE
1701
DOCUMENT STRUCTURE INSPECTION UNIT
DOCUMENT STRUCTURE DEFINITION LIBRARY
213
212
APPLICATION PROCESSOR
DOCUMENT STRUCTURE ALTERATION RULE LIBRARY
1711

FIG. 18

1805 1801 1802 1803 1804

	#	TYPE	APPLIED DEFINITION	OPERATION ELEMENT	RELEVANT DOCUMENT STRUCTURE DEFINITIONS
1811	1	Replace	*	EncryptedData.dtd: ／EncryptedData	EncryptedData.dtd KeyInfo.dtd
1812	2	Add	*	EncryptedKey.dtd: ／EncryptedKey	EncryptedKey.dtd KeyInfo.dtd
1813	3	Add	*	Signature.dtd: ／Signature	Signature.dtd KeyInfo.dtd
1814	4	Add	Signature.dtd	PurchaseOrder.dtd: /PurchaseOrder	PurchaseOrder.dtd: KeyInfo.dtd

FIG. 19

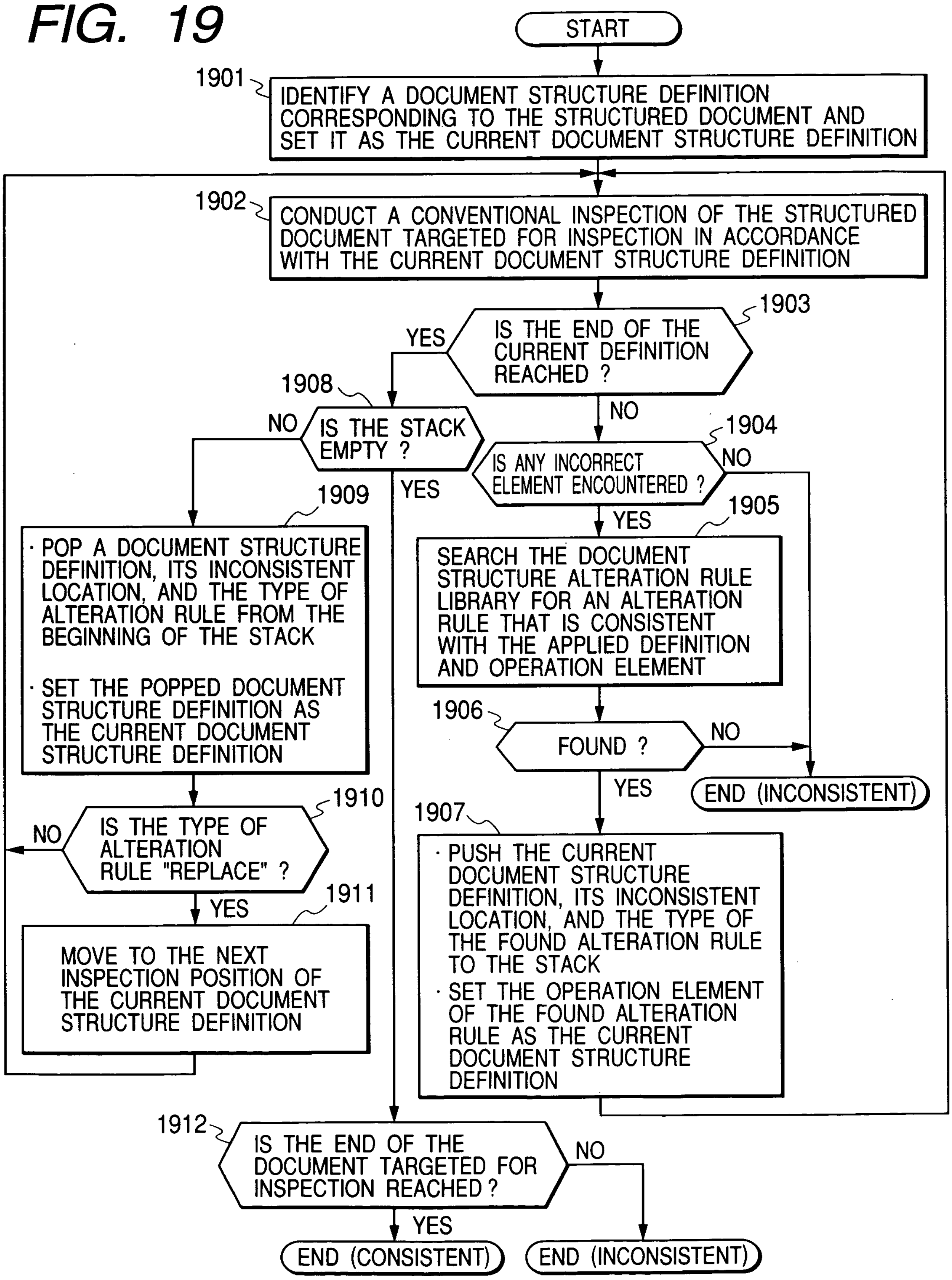

START
1901
IDENTIFY A DOCUMENT STRUCTURE DEFINITION CORRESPONDING TO THE STRUCTURED DOCUMENT AND SET IT AS THE CURRENT DOCUMENT STRUCTURE DEFINITION
1902
CONDUCT A CONVENTIONAL INSPECTION OF THE STRUCTURED DOCUMENT TARGETED FOR INSPECTION IN ACCORDANCE WITH THE CURRENT DOCUMENT STRUCTURE DEFINITION
1903
IS THE END OF THE CURRENT DEFINITION REACHED ?
YES
NO
1908
IS THE STACK EMPTY ?
NO
YES
1904
IS ANY INCORRECT ELEMENT ENCOUNTERED ?
NO
YES
1909
· POP A DOCUMENT STRUCTURE DEFINITION, ITS INCONSISTENT LOCATION, AND THE TYPE OF ALTERATION RULE FROM THE BEGINNING OF THE STACK
· SET THE POPPED DOCUMENT STRUCTURE DEFINITION AS THE CURRENT DOCUMENT STRUCTURE DEFINITION
1905
SEARCH THE DOCUMENT STRUCTURE ALTERATION RULE LIBRARY FOR AN ALTERATION RULE THAT IS CONSISTENT WITH THE APPLIED DEFINITION AND OPERATION ELEMENT
1906
FOUND ?
NO
YES
END (INCONSISTENT)
1910
IS THE TYPE OF ALTERATION RULE "REPLACE" ?
NO
YES
1911
MOVE TO THE NEXT INSPECTION POSITION OF THE CURRENT DOCUMENT STRUCTURE DEFINITION
1907
· PUSH THE CURRENT DOCUMENT STRUCTURE DEFINITION, ITS INCONSISTENT LOCATION, AND THE TYPE OF THE FOUND ALTERATION RULE TO THE STACK
· SET THE OPERATION ELEMENT OF THE FOUND ALTERATION RULE AS THE CURRENT DOCUMENT STRUCTURE DEFINITION
1912
IS THE END OF THE DOCUMENT TARGETED FOR INSPECTION REACHED ?
NO
YES
END (CONSISTENT)
END (INCONSISTENT)

FIG. 20

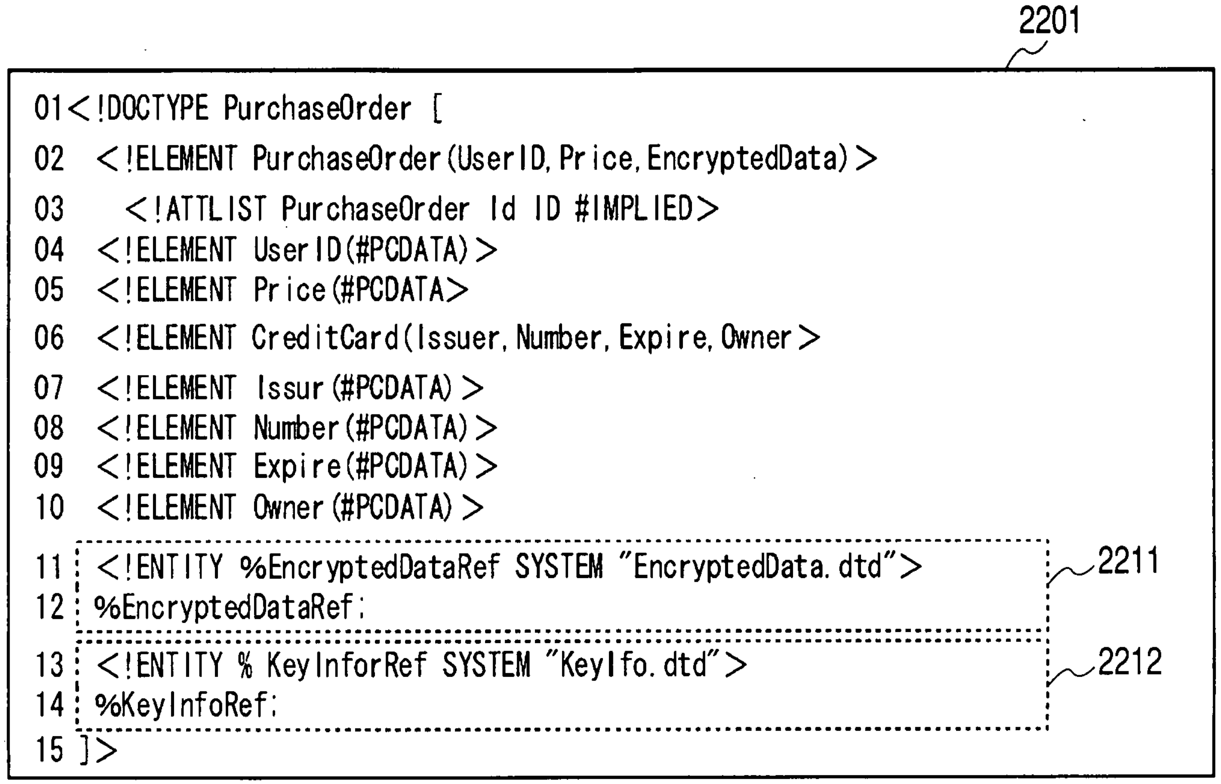
2001

PurchaseOrder.dtd	/PurchaseOrder/CreditCard	Replace

FIG. 21

PurchaseOrder.dtd	/PurchaseOrder/CreditCard/after()	Replace

FIG. 22



```
<!DOCTYPE PurchaseOrder [
<!ELEMENT PurchaseOrder(UserID,Price,EncryptedData)>
  <!ATTLIST PurchaseOrder Id ID #IMPLIED>
<!ELEMENT UserID(#PCDATA)>
<!ELEMENT Price(#PCDATA>
<!ELEMENT CreditCard(Issuer,Number,Expire,Owner>
<!ELEMENT Issur(#PCDATA)>
<!ELEMENT Number(#PCDATA)>
<!ELEMENT Expire(#PCDATA)>
<!ELEMENT Owner(#PCDATA)>
<!ENTITY %EncryptedDataRef SYSTEM "EncryptedData.dtd">
%EncryptedDataRef;
<!ENTITY % KeyInforRef SYSTEM "KeyIfo.dtd">
%KeyInfoRef;
]>
```